



[c9] 9.A system for registering images using retrospective gating, the system comprising:

- an imaging system;
- an object disposed so as to be communicated with said imaging system, wherein said imaging system generates image data responsive to said object; and
- a processing device, wherein said processing device executes a method comprising:
  - determining a target area of interest;
  - obtaining scout image data responsive to said target area;
  - processing said target area so as to create a sub-target area of interest;
  - computing a desired image acquisition time;
  - operating the imaging system so as to create image data responsive to each said sub-target area;
  - combining said image data for each of said sub-target areas to create a set of image data;
  - processing said image data to determine a phase of said image data; and
  - synchronizing said image data.

[c10] 10. The system of Claim 9 wherein said sub-target area corresponds to a size of a detector in a selected axis.

[c11] 11. The system of Claim 9 wherein said target area of interest corresponds to a size of a target.

[c12] 12. The system of Claim 9 wherein said set of image data corresponds to said target area of interest.

[c13] 13.The method of Claim 9, wherein said target area of interest is associated with an object to be imaged.

[c14] 14. The method of Claim 9 wherein said synchronizing includes utilizing said phase to correlate image data.

[c15] 15.A storage medium encoded with a machine-readable computer program code for registering images acquired using an imaging system with respiratory

gating, said medium including instructions for causing controller to implement a method comprising:

- determining a target area of interest;
- obtaining scout image data responsive to said target area;
- processing said target area so as to create a sub-target areas of interest;
- computing a desired image acquisition time;
- operating the imaging system to create image data responsive to each of said sub-target areas;
- combining said image data for each of said sub-target areas so as to create a set of image data;
- processing said image data to determine a phase of said image data; and
- synchronizing said image data.

- [c16] 16. The storage medium of Claim 15 further comprising computer program code wherein said operating includes establishing an acquisition time for said image data corresponding to a physiological cycle plus at least one of two thirds of a gantry rotation time and one gantry rotation time.
- [c17] 17. The storage medium of Claim 15 further comprising computer program code wherein said method further includes:  
synchronizing PET emission data utilizing said phase.
- [c18] 18.A computer data signal, said computer data signal comprising code configured to cause a controller to implement a method for registering images acquired using an imaging system with respiratory gating, the method comprising:  
determining a target area of interest;  
obtaining scout image data responsive to said target area;  
processing said target area so as to create a sub-target areas of interest;  
computing a desired image acquisition time;  
operating the imaging system to create image data responsive to each of said sub-target areas;  
combining said image data for each of said sub-target areas so as to create a set of image data;

processing said image data to determine a phase of said image data; and  
synchronizing said image data.

[c19] 19. The computer data signal of Claim 18 further comprising computer program code wherein said operating includes establishing an acquisition time for said image data corresponding to a physiological cycle plus at least one of two thirds of a gantry rotation time and one gantry rotation time.

[c20] 20. The computer data signal of Claim 18 further comprising computer program code wherein said method further includes:  
synchronizing PET emission data utilizing said phase.

[c21] 21. A system for registering images using retrospective gating, the system comprising a:  
means for determining a target area of interest;  
means for obtaining scout image data responsive to said target area;  
means for processing said target area so as to create a sub-target area of interest;  
means for computing a desired image acquisition time;  
means for operating said imaging system to create image data responsive to each said sub-target area;  
means for combining said image data for each of said sub-target areas to create a set of image data;  
means for processing said image data to determine a phase of said image data;  
and  
means for synchronizing said image data.

[c22] 22. The system of Claim 21 further comprising said means for operating including means for establishing an acquisition time for said image data corresponding to a physiological cycle plus at least one of two thirds of a gantry rotation time and one gantry rotation time.

[c23] 23. The system of Claim 21 further comprising:  
means for synchronizing PET emission data utilizing said phase.

[c24] 24. A method for assigning phases in images acquired using an imaging system

comprising:

operating said imaging system to create image data of an object and generate system data, wherein said system data includes object physiological information and imaging system information corresponding to each respiratory cycle;

processing said image data and said system data to determine a phase of said image data; and

synchronizing said image data.

- [c25] 25. The method of Claim 24 further including:
- determining a reference point in said system data;
- establishing said reference point as a zero phase;
- assign a phase of zero to an  $i$ th reference point of said system data and
- assigning  $2\pi$  phase for each subsequent cycle; and
- wherein said synchronizing includes selecting images with correlating phase.
- [c26] 26. The method of Claim 24 wherein said system data includes physiological data.
- [c27] 27. The method of Claim 26 wherein said physiological data includes respiratory cycle data.
- [c28] 28. The method of Claim 25 further including applying a wrap around technique to adjust said phase if said reference point occurs while said imaging system is not imaging.